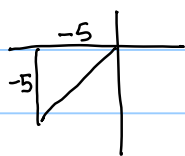


Exam 4 Review Key

Note Title

5/7/2012

1. $(-5, -5)$

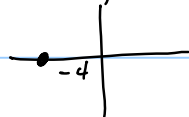


$$r = \sqrt{(-5)^2 + (-5)^2} = \sqrt{50} = 5\sqrt{2}$$

$$\theta = \frac{5\pi}{4}$$

$$\boxed{(5\sqrt{2}, \frac{5\pi}{4})}$$

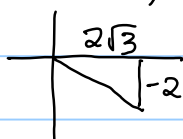
2. $(-4, 0)$



$$r = 4 \quad \theta = 180^\circ$$

$$\boxed{(4, 180^\circ)}$$

3. $(2\sqrt{3}, -2)$



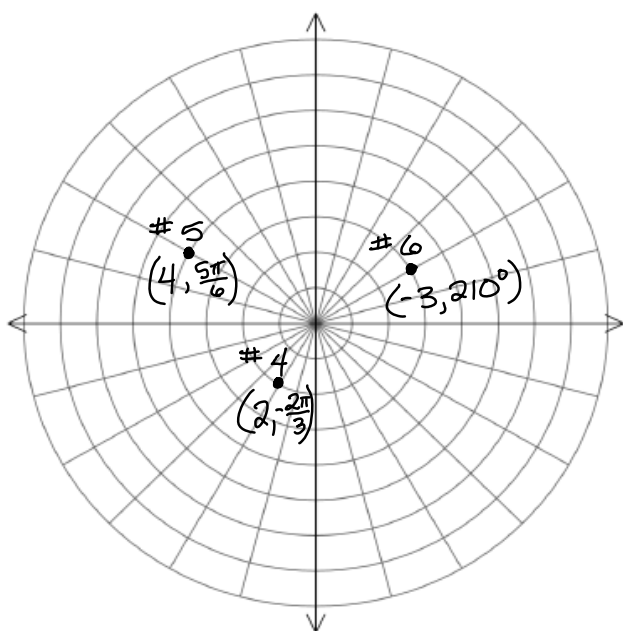
$$r = \sqrt{(2\sqrt{3})^2 + (-2)^2} = \sqrt{12 + 4} = \sqrt{16} = 4$$

$$\sin \theta = -\frac{2}{4} = -\frac{1}{2} \quad \text{Quadrant IV}$$

$$\theta = 330^\circ$$

$$\boxed{(4, 330^\circ)}$$

4-6.



7. $(-2, \frac{3\pi}{4})$

$$x = -2 \cos\left(\frac{3\pi}{4}\right) = -2\left(-\frac{\sqrt{2}}{2}\right) = \sqrt{2}$$

$$y = -2 \sin\left(\frac{3\pi}{4}\right) = -2\left(\frac{\sqrt{2}}{2}\right) = -\sqrt{2}$$

$$\boxed{(\sqrt{2}, -\sqrt{2})}$$

8. $(3, -\frac{1}{2}\pi)$

$$x = 3 \cos(-\frac{\pi}{2}) = 3(0) = 0$$

$$y = 3 \sin(-\frac{\pi}{2}) = 3(-1) = -3$$

$$\boxed{(0, -3)}$$

9. $(-4, \frac{4\pi}{3})$

$$x = -4 \cos \frac{4\pi}{3} = -4(-\frac{1}{2}) = 2$$

$$y = -4 \sin \frac{4\pi}{3} = -4(-\frac{\sqrt{3}}{2}) = 2\sqrt{3}$$

$$\boxed{(2, 2\sqrt{3})}$$

10. $r = 7$ see graph paper

No matter what θ is, r is 7.

11. $r = -6 \sin \theta$ see graph paper

θ	0°	15°	30°	45°	60°	75°	90°
r	0	-1.6	-3	-4.2	-5.2	-5.8	-6

symmetric around y-axis

12. $r = 3 - 3 \cos \theta$ see graph paper

θ	0°	15°	30°	45°	60°	75°	90°
r	0	.1	.4	.9	1.5	2.2	3

θ	105°	120°	135°	150°	165°	180°
r	3.8	4.5	5.1	5.6	5.9	6

symmetric
around x-axis

13. $r^2 = 4 \sin(2\theta)$ see graph paper

θ	0°	15°	30°	45°	60°	75°	90°
r^2	0	2	$2\sqrt{3}$	4	$2\sqrt{3}$	2	0

r	0	± 1.4	± 1.9	± 2	± 1.9	± 1.4	0
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14. $r = 3 + 6 \sin \theta$ See graph paper

θ	0°	15°	30°	45°	60°	75°	90°
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r	3	4.6	6	7.2	8.2	8.8	9
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θ	-15°	-30°	-45°	-60°	-75°	-90°
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r	1.4	0	-1.2	-2.2	-2.8	-3
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symmetric
around y-axis

15. $r = 4 \sin (3\theta)$ See graph paper

θ	0°	15°	30°	45°	60°	75°	90°	105°	120°
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r	0	2.8	4	2.8	0	-2.8	-4	-2.8	0
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θ	135°	150°	165°	180°
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r	2.8	4	2.8	0
-----	-----	---	-----	---

16. $r = 5 - 2 \sin \theta$ See graph paper

θ	0°	15°	30°	45°	60°	75°	90°
----------	-----------	------------	------------	------------	------------	------------	------------

r	5	4.5	4	3.6	3.3	3.1	3
-----	---	-----	---	-----	-----	-----	---

θ	-15°	-30°	-45°	-60°	-75°	-90°
----------	-------------	-------------	-------------	-------------	-------------	-------------

r	5.5	6	6.4	6.7	6.9	7
-----	-----	---	-----	-----	-----	---

symmetric
around y-axis

17. $r = 5 \cos (4\theta)$ See graph paper

θ	0°	22.5°	45°	67.5°	90°	112.5°	135°
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r	5	0	-5	0	5	0	-5
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θ	157.5°	180°	202.5°	225°	247.5°	270°
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r	0	5	0	-5	0	5
-----	---	---	---	----	---	---

18. $r = 7$

$r^2 = 49$

(square both sides)

$x^2 + y^2 = 49$

19. $r = 5 \cos \theta$

$r^2 = 5r \cos \theta$ (multiply both sides by r)

$$\boxed{x^2 + y^2 = 5x}$$

20. $r = 7 \csc \theta$

$$r = \frac{7}{\sin \theta}$$

$$(\csc \theta = \frac{1}{\sin \theta})$$

$$r \sin \theta = 7$$

$$\boxed{y = 7}$$

21. $x^2 + y^2 = 64$

$$r^2 = 64$$

$$\boxed{r = 8}$$

22. $x = 5$

$$r \cos \theta = 5$$

$$r = \frac{5}{\cos \theta}$$

$$\boxed{r = 5 \sec \theta}$$

23. $x^2 + y^2 + 5y = 0$

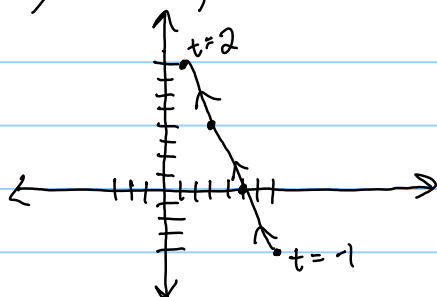
$$r^2 + 5r \sin \theta = 0$$

$$r^2 = -5r \sin \theta$$

$$\boxed{r = -5 \sin \theta}$$

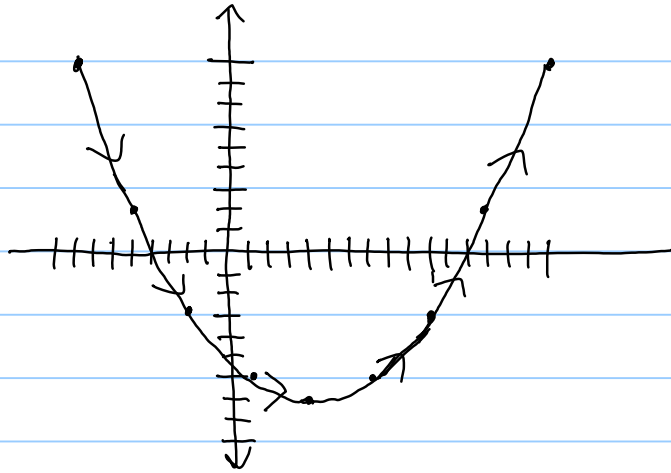
24. $x = -2t + 5, y = 4t; -1 \leq t \leq 2$

t	x	y
-1	7	-4
0	5	0
1	3	4
2	1	8



25. $x = 3t + 4$, $y = t^2 - 7$; $-4 \leq t \leq 4$

t	x	y
-4	-8	9
-3	-5	2
-2	-2	-3
-1	1	-6
0	4	-7
1	7	-6
2	10	-3
3	13	2
4	16	9



26. $x = 8t$ $y = 4t + 9$
 $t = \frac{x}{8}$ $y = 4\left(\frac{x}{8}\right) + 9$
 $y = \frac{1}{2}x + 9$ line

27. $x = t + 5$ $y = t^2 + 3$
 $x - 5 = t$ $y = (x - 5)^2 + 3$
 $y = x^2 - 10x + 25 + 3$
 $y = x^2 - 10x + 28$ parabola

28. $x = 4 \cos \theta$ $y = \sin \theta$
 $\frac{x}{4} = \cos \theta$
 $\frac{x^2}{16} = \cos^2 \theta$ $y^2 = \sin^2 \theta$
 $\frac{x^2}{16} + y^2 = \cos^2 \theta + \sin^2 \theta$
 $\frac{x^2}{16} + y^2 = 1$ ellipse

$$29. \quad t=0: (1, -2)$$

$$x = m_1 t + b_1$$

$$1 = m_1(0) + b_1$$

$$b_1 = 1$$

$$13 = 3m_1 + b_1$$

$$13 = 3m_1 + 1$$

$$12 = 3m_1$$

$$m_1 = 4$$

$$\boxed{x = 4t + 1}$$

$$t=3: (13, 1)$$

$$y = m_2 t + b_2$$

$$-2 = m_2(0) + b_2$$

$$b_2 = -2$$

$$1 = 3m_2 + b_2$$

$$1 = 3m_2 - 2$$

$$3 = 3m_2$$

$$m_2 = 1$$

$$\boxed{y = t - 2}$$

$$30. \quad t=3: (2, 5)$$

$$x = m_1 t + b_1$$

$$-1(2 = 3m_1 + b_1)$$

$$-10 = 7m_1 + b_1$$

$$-2 = -3m_1 - b_1$$

$$-12 = 4m_1$$

$$m_1 = -3$$

$$2 = 3(-3) + b_1$$

$$2 = -9 + b_1$$

$$b_1 = 11$$

$$\boxed{x = -3t + 11}$$

$$t=7: (-10, 13)$$

$$y = m_2 t + b_2$$

$$-1(5 = 3m_2 + b_2)$$

$$13 = 7m_2 + b_2$$

$$-5 = -3m_2 - b_2$$

$$8 = 4m_2$$

$$m_2 = 2$$

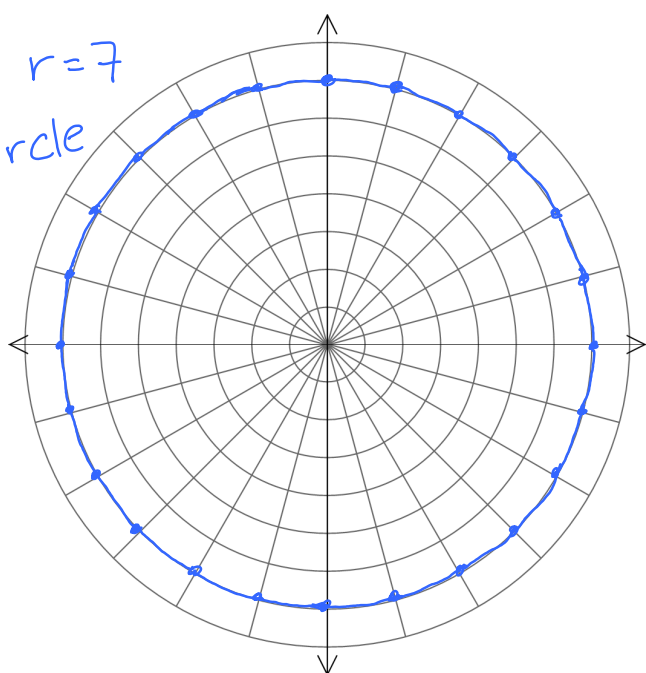
$$5 = 3(2) + b_2$$

$$5 = 6 + b_2$$

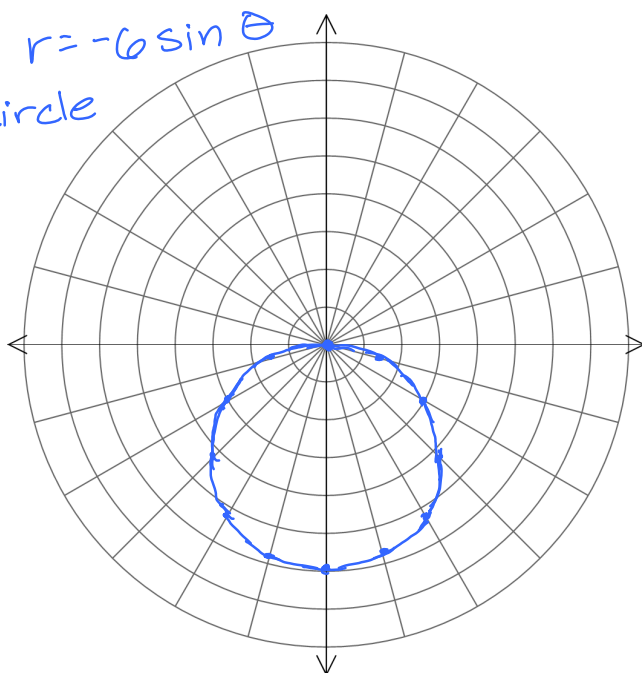
$$b_2 = -1$$

$$\boxed{y = 2t - 1}$$

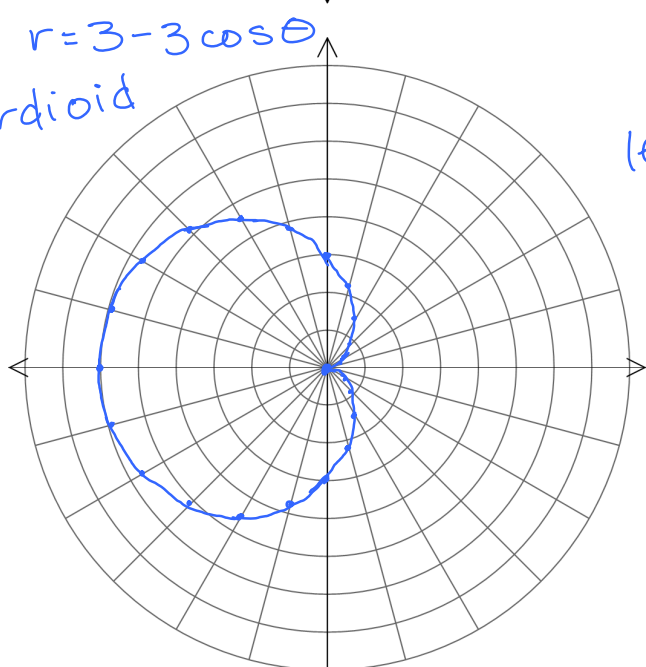
10. $r=7$
circle



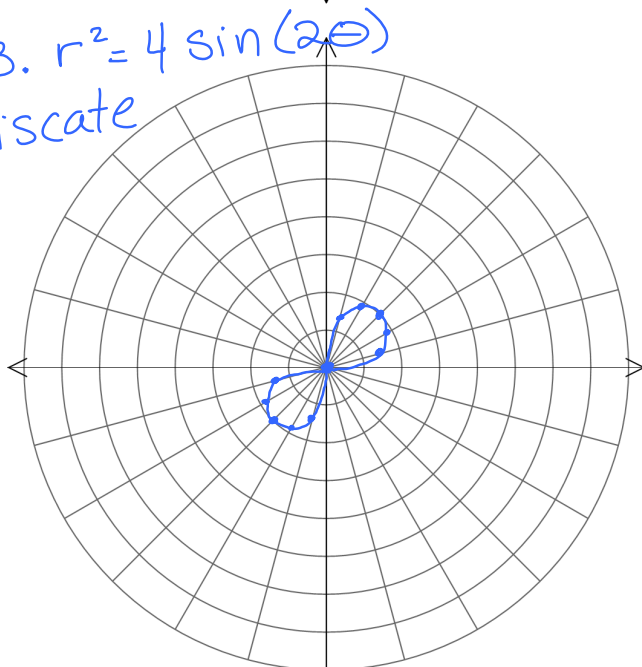
11. $r=-6\sin\theta$
circle



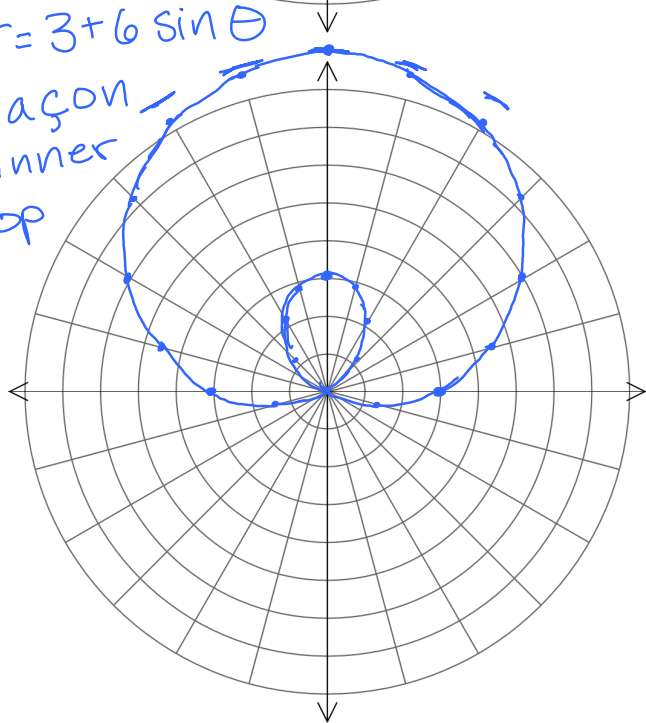
12. $r=3-3\cos\theta$
cardioid



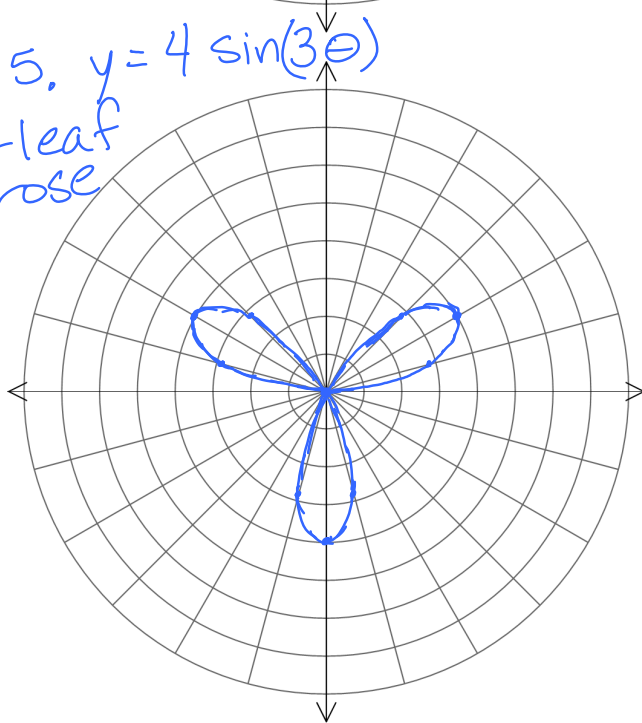
13. $r^2=4\sin(2\theta)$
lemniscate



14. $r=3+6\sin\theta$
limaçon
w/ inner
loop

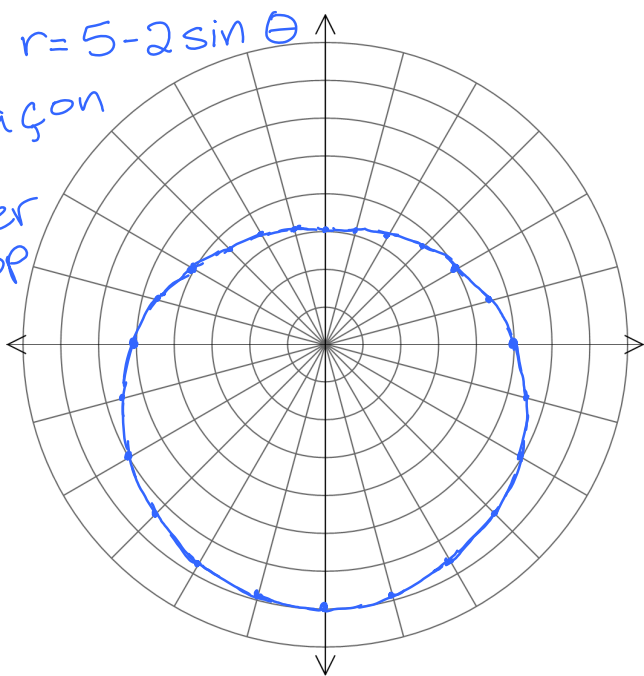


15. $y=4\sin(3\theta)$
3-leaf
rose



16. $r = 5 - 2 \sin \theta$

limaçon
w/o
inner
loop



17. $r = 5 \cos(4\theta)$

8-leaf
rose

